

ARCE

A construction worker in a white tank top and shorts is silhouetted against a vibrant orange sunset sky. The worker is sitting on a horizontal steel beam, with a vertical ladder-like structure next to them. In the background, a dark, forested hill is visible under the warm glow of the setting sun.

ARCHITECTURAL ENGINEERING DEPARTMENT | COLLEGE OF ARCHITECTURE AND ENVIRONMENTAL DESIGN | CAL POLY | SPRING 2009

TACKLING ONE LAST
PROJECT WITH
GRADUATION ON
THE HORIZON

Senior Project

Mixing It Up

That's a good thing,
as disciplines go

As you know, our college has a strong interdisciplinary history that is very much rooted in architectural engineering as the founding program. Although we no longer offer a combined first year for the departments, we are instead creating multiple points for our students to come together across disciplines.

In this magazine you will read about some of these experiences that are part of formal classes, but even more exciting are the many points of connection our students make on their own – from senior projects to master's projects.

Architectural Engineering continues to play an important role in our college, and we applaud the accomplishments of the students and faculty. In addition, we are always impressed by the success of ARCE alumni. Stay in touch, come visit us on campus, and thanks for your support.



R. THOMAS JONES, AIA

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On the Cover

A stick structure rises in Poly Canyon as a senior project – one of many tackled by ARCE students such as Justin Porter. See page 15.

PHOTO BY KATIE BLAESSER



Al Estes with an old friend

Department Head's Message

Way to Grow

Evolving ARCE is a reflection of friends, faculty, students

This has been another busy year for the ARCE Department. In the fall we received a six-year accreditation from ABET and now have the opportunity to undertake the first major examination of the curriculum in a long while. Teaching undergraduates remains our top priority, and we are focusing heavily on interdisciplinary opportunities with architecture and construction management.

At the same time we are into our second year of the graduate program, a component of education we are proud to offer and one which we feel enhances the undergraduate education that is our mainstay. And faculty are finding the time to engage in some interesting and very practical research, some of which you will read about in this magazine.

Now that the renovation of Building 21 is complete and we have moved back in, we hope to upgrade the rest of our equipment and facilities, a process that will certainly involve partnerships with friends and alumni.

In this issue, we profile the firm of Barrish-Pelham & Associates. They have hired many ARCE graduates over the years, attended numerous structural forums and have remained a loyal friend to this department. We are pleased to recognize their accomplishments and those of our legions of successful alumni.

I HOPE YOU WILL ENJOY READING
ABOUT OUR STUDENTS IN THIS ISSUE.
I FIND IT FASCINATING TO SEE THE
CIRCUITOUS ROUTES THAT THEY
TAKE TO GAIN ADMISSION TO THIS
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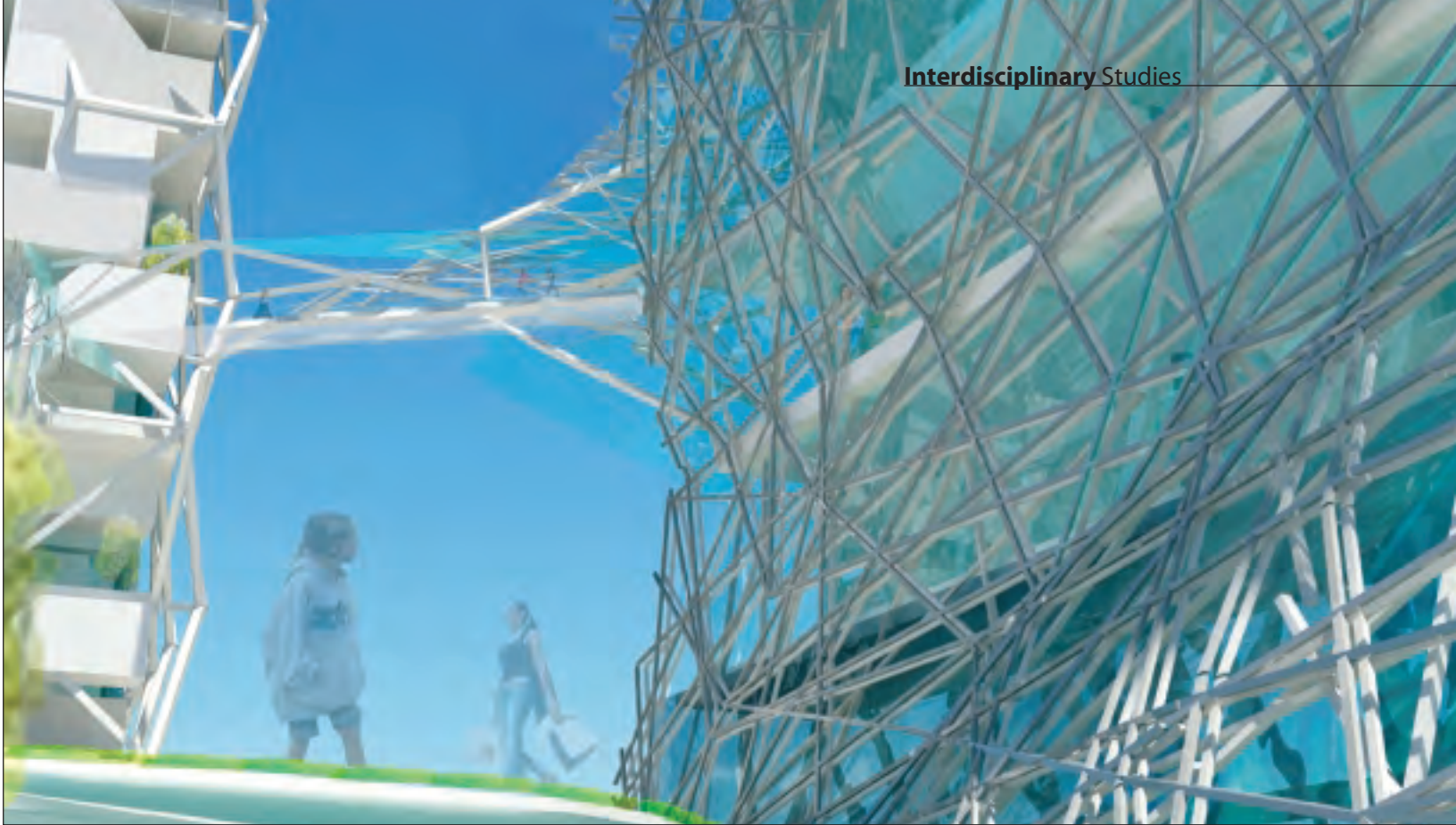
While many magazines these days concentrate solely on alumni, we want to use this opportunity to keep you involved with our activities on campus and with our students. I hope you will enjoy reading about our students in this issue. I find it fascinating to see the circuitous routes that they take to gain admission to this outstanding program.

I hope that this newsletter keeps you informed on what we are accomplishing in the ARCE program and will encourage you to want to become more involved.

On a final note, I want to personally thank the industry partners on the ARCE Advisory Board who have helped guide all of these efforts.



ALLEN C. ESTES, DEPARTMENT HEAD



CROSSING PATHS

Students benefit from mix of Architectural Engineering, Construction Management and Architecture curriculum

“Every ARCE student will graduate having had a meaningful interdisciplinary experience,” says Department Head Al Estes.

This is less a mandate from the top down than it is a response to what industry partners, faculty and students all acknowledge is important to education today.

“We have a unique advantage being one of the few structural engineering programs in the country housed in the same college

as architecture and construction,” says Al. “The college has a rich history of bringing disciplines together early in a student’s academic career. An upper-division, project-based laboratory experience augments this advantage and sets the students up for success when they graduate.”

Starting in fall 2009, architecture, architectural engineering and construction management will co-develop and offer a five-unit, project-based studio lab with an instructor from each of the three departments. Students will work in small interdisciplinary teams to create an integrated building design. Brent Nuttall and Jill Nelson are the ARCE faculty members developing the course.

“This studio takes a real project with a real client and develops the project all the way through budget and schedule,” Brent says. This is accompanied by a management plan and constructability approach including risk management and mitigation plan and, finally, full LEED analysis. Add to that, the students

Interdisciplinary learning is reflected in student projects such as “Assembling Housing,” which won honorable mention at the 2008 ACSA/AISC Steel Competition.



Paths

from page 3

are graded on their formal presentations. “I hope the students leave with a better understanding of the other disciplines in terms of how they approach problems and what their colleagues do in their respective fields.”

This course will be the primary means to ensure that every ARCE student participates in interdisciplinary studies, but there are other alternatives. Professor Kevin Dong has been on the forefront of the interdisciplinary initiative since 2005, beginning with the Collaborative Design Studio, which involved

ARCE majors from Cal Poly and Iowa State University. The class evolved into a college movement involving faculty from architecture and construction management.

Last year, an interdisciplinary fourth-year studio was created around the annual ACSA/AISC Steel Competition. Four CAED teams entered the competition, with one receiving an honorable mention for its “Assembling Housing” proposal.

This year, students are submitting designs for “the high school of the future.” In addition to guest reviews by alumni and department friends, the design firm Buro

Happold has generously volunteered its time and expertise to help guide the students through collaborative design exercises and expose the students to green concepts.

“Colleagues from Buro Happold participate in studio crits and video conferencing throughout the process,” says Kevin. “They provide insight into sustainability, environmental and structural issues.” The studio will travel to Happold’s Los Angeles office for its initial spring quarter review.

Parallel to the studio is a professional elective, Integrated Building Envelopes, taught by Kevin Dong with Architecture

Student Leigh Guggemos makes a presentation in the Integrated Building Envelopes class.

Professor Brent Nutall (far right)

Students in the Collaborative Design Studio visit Taliesin West on a field trip to Phoenix, Ariz. (below).





Professor Jim Doerfler and Construction Management Professor Mike Montoya. The seminar attracts upper-level students from all three disciplines and covers design, construction and integrated project delivery methods. It includes an introduction to Building Information Modeling (BIM) workshop and brings in industry partners to share their experiences about materials, procurement, testing and installation. Partners such as Lou Palandrani (Clark Construction), Ed Knowles (Walters & Wolf), and Nancy Brown (Autodesk) are essential to its success.

Interdisciplinary collaborations are a staple for many senior projects. The most successful has been the design of Same Polytechnic in Tanzania. What started as a senior project for ARCE student David Lambert blossomed into a Master's Project involving undergraduates from all five college departments. Even though David has graduated, the project proceeds unabated. There are currently 24 undergraduates from across the college who continue to work on the engineering details that include waste water, passive radiation, structural details, construction scheduling, and architectural layout. Faculty member James Mwangi traveled to Tanzania over Spring Break, and faculty advisor Craig Baltimore will take a group of students to Africa this summer.



"Once you start looking for interdisciplinary projects within the college they are everywhere," Al Estes notes. "As the successes build, we hope to develop a culture of collaboration that will continue into the professional world. I expect those industry partners who hire our graduates will see the effect of these upper division interdisciplinary experiences in their offices. We are uniquely poised to offer this experience." Al believes that the Master's Program can play a large role in this collaborative culture as well.

Cal Poly ARCE students work with Iowa State University ARCH students as part of the second Collaborative Design Studio class (top). Students are (from left): Rebecca Bachar (Poly), Andy Felt, Shawna Ziebert, Jarrod Siegel (ISU) and Katrina Hagg (Poly).

Project critiques by an interdisciplinary panel are a valuable part of the studios (above). ISU's Jacki Kenkel (left) and Cal Poly's Sarah Wagner get feedback from Kevin Dong (left).

Digging ARCE

Grad Leigh Guggemos' hard work at Poly translates into a real-world job



Most people can't point to a single class that influenced their career. Leigh Guggemos can: ARCE 211 Statics. Prior to this, Leigh, like many young students, was focused on a career in architecture tied to an early interest in building.

"Architecture was my focus when I was at a junior college in the Bay Area, and because of its reputation, I knew I wanted to end up at Cal Poly," says Leigh. "Statics was the first time I was exposed to the structural engineering side of the industry, and it piqued my interest. Over time I realized it was a better fit for my particular interests and abilities."

Leigh's abilities were showcased as a member of the Cal Poly architecture and architectural engineering team that received an honorable mention in the 2008 ACSA/AISC Design Competition. (A video produced by Cal Poly about the competition entry is online at www.youtube.com/calpolysanluisobispo.)

Actively involved in several organizations, including service as vice president of Poly Habitat Club, Leigh was Structural Forum chair in 2008, an event he remembers as the proverbial best and worst of times.

"At times, organizing the event was the best part of my day, other times it was an exercise in patience, but always it was rewarding, and I am grateful for the experience." He adds that it is a tremendous learning experience and a unique opportunity to interact with fellow students and industry professionals outside of the classroom. "I think that for the student body, Structural Forum represents the possibilities that all of our hard work has opened up to us; too often we get caught up in the daily trials of class, and it's good to have a day to re-center ourselves and remember why we are in such a great program."

As he makes the transition from the classroom to the professional world, Leigh reflects on his work experience, particularly for Lionakis in Sacramento.

"A great experience," he says. "Everyone there was great to work with, and they really let me get my hands dirty with a variety of projects."

Leigh Guggemos helped to construct the Chinese Park in downtown San Luis Obispo.



Leigh and former SEAOC President Hayley Soderlund ('08) at an awards ceremony

"WHEN YOU START YOUR LAST YEAR OF SCHOOL, IT IS REASSURING WHEN YOU LOOK BACK ON A SUMMER'S WORK AND REALIZE YOU ENJOYED IT MORE THAN YOU HAD HOPED."

Leigh notes that many of the engineers at Lionakis are Cal Poly ARCE alumni, which he believes made them more comfortable with the Cal Poly interns. "They know the program and what we are capable of, and they allowed me and [fellow intern] Joe Thompson to hit the ground running."

Summer 2008 was Leigh's first engineering work experience, and it left him ready for more. "When you start your last year of school, it is reassuring when you look back on a summer's work and realize you enjoyed it more than you had hoped."

Now working for Parsons Brinckerhoff in San Francisco, Leigh says of his first weeks there, "So far, it's going great." Leigh is with the firm's structural engineering group, and the current "big project" is Doyle Drive, the south access to the Golden Gate Bridge. For Leigh, it is the perfect beginning to a career: solid experience. Eventually he is interested in exploring forensics and evaluations.

"I think fewer firms focus on forensics as a primary part of their business, and perhaps that could be my niche," he says, looking down the road. "For now, I'm focused on doing well in my first job after graduation."



A Promising New Direction

Jackie Webber's math studies at UC Davis lead her to ARCE at Cal Poly

"Circuitous" is how Jackie Webber describes her path to ARCE at Cal Poly. A native of Vacaville, she was always a strong math student, and after high school, elected to attend UC Davis to study economics. "Not very challenging," is how she describes her first year. She was seeking a new direction when a family friend suggested another career involving math skills: architecture.

Based on its reputation, Jackie decided to transfer to Cal Poly. This decision to pursue an entirely new professional direction was a difficult one since it meant relinquishing a full scholarship at Davis. To enhance her chances of acceptance into the College of Architecture and Environmental Design, Jackie enrolled at Cuesta College. That is where the path again diverged. Faced with capacity architecture classes, Jackie enrolled in engineering courses. And found her career.

A year and a half after entering college, Jackie entered the ARCE Department. "I met

with Professor Abe Lynn, who handles all of the transfer students, before enrolling," Jackie recalls. The difference in experiences from her start at Davis was immediate and one of the lasting memories of her time at Cal Poly. "Then weeks later, on the first day of class, Abe saw me in the hall and knew my name and my courses." Preparing to graduate this spring, Jackie says that interaction between faculty and students was a hallmark of her experience. "The intimacy of the program and the level of respect between students and faculty is important."

With a firm foundation in math and committed enough to leave a scholarship to enter the ARCE program, Jackie has taken care to round out her experiences beyond the classroom. She has interned with four companies, and each experience has given her a specific perspective. "I worked for a two-person firm doing drafting, then with ATi, an architecture and engineering firm in the Bay Area, at Disney with facility engineering and then at Rudolph and Sletten in estimating." These experiences have only broadened Jackie's ideas about what the future may hold.



Jackie Webber on campus (top) and on a SEAO 2008 fall quarter trip to San Francisco

"In a perfect world, I would like to be involved in pre-construction: costing, pre-design and estimating," Jackie admits that while she can do the detail work, she prefers the overview. "I want to see the entire project come together."

At the same time, she understands the current economy may mean riding another curve in her trajectory. And who knows, it might lead to an even more interesting future.

The Value of Research

Faculty activities
stimulate the intellect
and enrich the
curriculum, ultimately
benefiting students
and industry

Faculty research at a teaching institution? Yes, but in small doses and not at the expense of the undergraduate teaching.

Faculty in the ARCE Department are working on practical research that will enhance their teaching and professional development. In most cases, the research can involve students and the results can be brought into the classroom.

Gimme Sustainable Shelter

Ed Saliklis, Ph.D., P.E. has teamed with Architecture faculty member Robert Arens, AIA, to develop a Rapid Assembly Disaster

Response Shelter made from recycled plastic materials. The collaborative nature of the project is particularly important to Ed.

"This is truly interdisciplinary and cross-disciplinary," he notes, adding that they are also working with colleagues in Materials Engineering at Cal Poly.

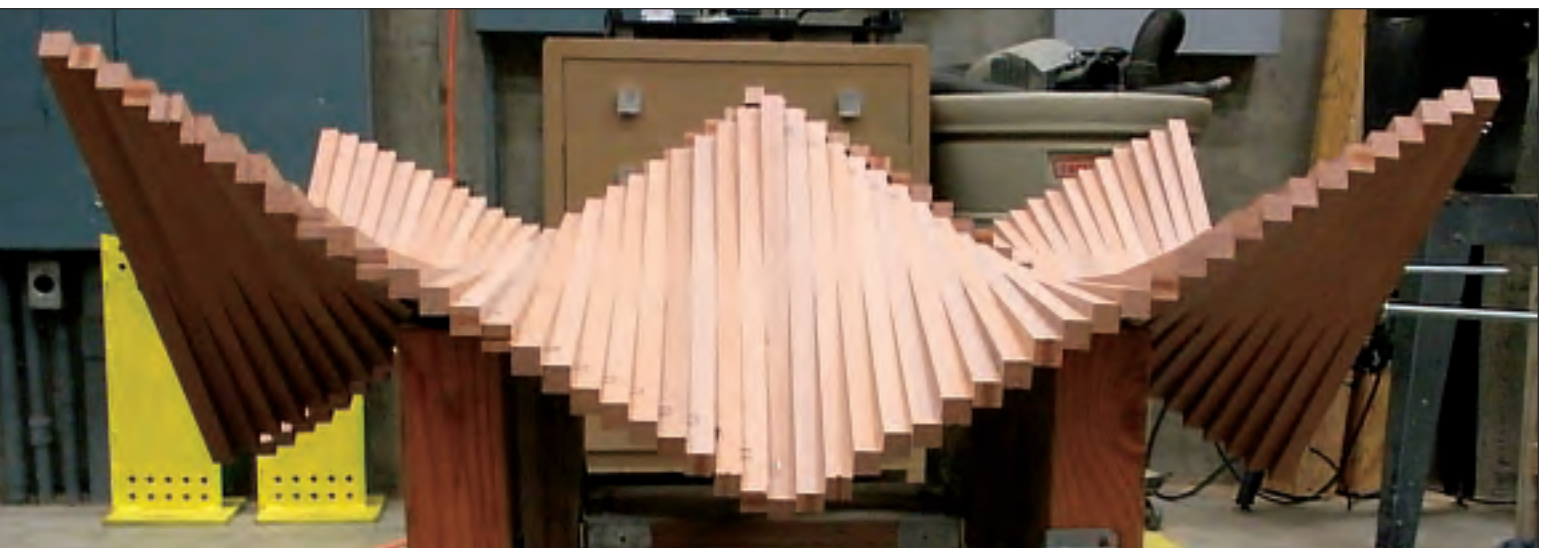
The premise is a shelter that uses sustainable materials and is constructible with a little training and very few hand tools. "It is not a house but a shelter," Ed adds.

His early research was on thin shell structures, particularly those of Rafael Guastavino in the early 20th century. This was the inspiration for the next stage: exploration of the rich tradition of thin shell hyperbolic paraboloid design in the context of contemporary building materials.

The proposed shelters use the hyperbolic paraboloid (hypar) as the basic structural unit. They chose the hypar because it is generated from straight line segments which are easily trucked to disaster sites. The structural units are made of recycled high-density polyethylene (HDPE) reinforced with agricultural fibers. The resulting extruded



Ed Saliklis (left) and Robert Arens (center) draw students into the design and construction of their shelter project (below).





boards are lightweight, strong and easy to manipulate by hand.

As part of the interdisciplinary effort, two architecture students are studying how to make the structure habitable while three materials engineering students are testing a variety of materials for accelerated aging and structural properties.

Along with Robert Arens, Ed will present a paper on the project at this summer's International Association for Shell and Spatial Structures symposium in Valencia, Spain, fittingly the birthplace of Rafael Guastavino.

Grooming Young Engineers

Professor Pamalee Brady, Ph.D., P.E., is committed to engaging a diverse population in the principles of engineering. For her, there is no better place to activate interest in the profession than among young students. Very young students. Over the last three years

Pamalee has developed teaching tools for California teachers to introduce children in 4th-6th grades to engineering within the context of the existing math and science curriculum. "Basic engineering concepts," is how she describes the approach, an understatement for an interlocking series of activities that helps students see engineering in their everyday lives.

Engineering schools across the country struggle to attract a diverse applicant pool, and Pamalee hopes that by starting early and reaching out to students who might not otherwise consider an engineering career, inroads will be made in this problem.

Pamalee's interest in motivating students toward a career in engineering has caused her to push her research into a variety of venues ranging from Engineering Days at Cal Poly, where high school students have a hands-on



ARCE student Melissa Humber (top) demonstrates to high school students how to have fun with an exercise designed by Pamalee Brady (above) to stimulate their interest in engineering studies.

Research

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experience in Cal Poly Engineering Labs, to linking engineering to art and literature.

Why the diverse approach? Pamalee is convinced that to reach children with different perspectives educators need to use different perspectives to activate their interest. She is developing stories about engineers with associated activities appropriate for secondary education. All part of diversifying the methods of engagement for their diverse audience.

Solar Research Heats Up

When Professor Craig Baltimore, Ph.D., P.E., finds a free moment in his heavy teaching load, it is dedicated to a project he is working on with Cal Poly Physics Professor Peter Schwartz: developing Intermediate Scale Solar Thermal Electric (STE) for urban areas.

STE is an industry term that means collecting solar energy in the form of heat, which is then used in all manners including electrical generation, thermal storage, heating

Cole McDaniel (left) and Graham Archer (lower left) demonstrate monitoring of the dynamic response of the Construction Innovations Center.

water and creating air conditioning from absorption chillers. Craig notes that ARCE's strong connection to industry was a motivating factor in the speed with which this project moved forward. Between them, the two men bring the balance of thermal energy and structural engineering knowledge necessary to make the project work.

"Peter and I talked about this as an interest in winter 2007, and then I called some of our industry partners and they responded with ideas, and practical assistance. Suddenly we have a full-fledged research agenda that, hopefully, will also quickly bring results to industry," says Craig.

Currently most research into alternative energy or the next generation of solar energy focuses on large-scale usage. Craig and Peter are interested in the intermediate solution: the system that is sized and structured so it may be placed next to the user instead of in the vast space of the desert.

In addition, Craig is involved in work in rural East Africa. The project started as a senior project and progressed to a Master's Project. Now it is an Instructionally Related Activity (IRA) shared with ARCE faculty member James Mwangi. The effort started

with an orphanage for children of AIDS in Kenya and in recent years has focused on finding resources to send students to Africa.

Computers: Friend or Foe?

Faculty members Cole McDaniel, Ph.D., P.E., and Graham Archer, Ph.D., P.Eng., have spent the past two years monitoring the new Construction Innovations Center to obtain the dynamic characteristics of the building to compare with computational models. The goal of the research is to improve student understanding of the dynamic response of buildings while imparting to students a healthy skepticism for their computer model results. With a small forced vibration and sensitive accelerometers, students can determine fundamental frequencies, damping coefficients and mode shapes.

"Students tend to think their computer model is accurate," says Graham. "The students are often surprised to find that computer models, when compared to real structures, are poor representations, sometimes off by as much as 300 percent."

Joining in their research is graduate student Danny Means, who has chosen this problem as his thesis topic. He is using a simple two-story building frame in the lab and is comparing the "real" frame behavior to the computer-generated results to better predict the dynamic response of buildings.

This current research is actively woven into the structural dynamics course and the seismic design and analysis course. Cole and Graham are applying for research grants that will allow them to create a database of the dynamic response of typical two- to four-story buildings, examine pre- and post-seismic behavior, and predict building deterioration.

The next step: fully instrumenting the new Simpson Strong-Tie building during construction to monitor the change in the dynamic response.

Department head Al Estes is very supportive of the research activities of the faculty, noting that a moderate degree of faculty research enhances the program, develops the faculty, stimulates intellectual curiosity, involves students, and helps maintain contact with other universities and industry.





Jill Nelson discusses projects with students in ARCE 211.

Jill Nelson

Sharing her knowledge with the next generation

Jill Nelson joined the faculty as an assistant professor in fall quarter 2008. She received her B.S. in civil engineering from the University of Nevada and a master's in civil engineering from the University of Washington. A registered civil and structural engineer in Washington and California, Jill is also a certified value specialist and LEED AP.

She brings extensive professional experience to the classroom. As a certified value specialist, she has facilitated on a variety of studies for over 200 public buildings, educational facilities, hospitals and complex transportation projects. She runs both qualitative and quantitative risk analysis.

In addition, Jill has led multidiscipline teams in solving challenges for a range of clients with structural engineering experience

incorporating wood, concrete, steel, and masonry materials for the design of buildings.

Jill has also been involved in seismic assessment and renovation and has programming and project management experience with the U.S. Army Corps of Engineers and the Navy.

Jill served as advisory board chair at Seattle University for several years and loved the concept of teaching. Cal Poly's practitioner path was a perfect fit.

"I was at a point in my career where I felt I could make a contribution in the classroom," Jill says. "Cal Poly seeks those contributions; the university prides itself on integrating the professional perspective, so what better place to talk about engineering with the next generation."

Jim Guthrie

Bringing his real-world expertise to the classroom

Jim Guthrie joined the faculty in spring 2009. He brings a wealth of professional experience and represents one of the unique opportunities in the ARCE Department; namely, that there are academic positions open specifically for professionals.

Jim received his bachelor's degree in civil engineering at UC Davis and master's in structural engineering at UC Berkeley. For over three decades he has been associated with Forell/Elsesser Engineers, in recent years as a senior partner.

Jim has designed hundreds of large and small public buildings – new construction, renovation, seismic upgrades and evaluations. His projects have encompassed numerous building types and structural systems, including traditional concrete, steel, timber and masonry as well as newer systems such as buckling restrained braced frames, base consolidation and composite fiber reinforcement. Jim has also served as Major Project Structural Representative on the San Francisco Code Advisory Committee for over a decade.

"After 30 years in practice and 20 as a principal in a consulting firm, I was looking for a change in life and new professional challenges," says Jim. "I've long thought that I'd like to teach at an institution like Cal Poly and jumped when the opportunity arose. I believe few, if any, universities have Cal Poly's reputation in educating structural engineers, with its emphasis on practice experience. I'm very excited to be here."



Jim Guthrie

Clay Pharaoh retired from the ARCE faculty in 2008 and was honored by President Baker with emeritus status during the 2008-09 academic year.

He joined the Cal Poly faculty in August 1986, and for more than 20 years he significantly impacted the lives of students and his colleagues. Remarkably, he retired with more years of service to ARCE than the next three most senior faculty members combined.

In addition to teaching a wide range of structural analysis and design courses, Clay served as interim department head in 2003. He also provided steady guidance for 22 years as faculty advisor to the student chapter of the Structural Engineers Association of California (SEAOC). As advisor, he led many student field trips to significant projects in major cities including New York, Chicago, Boston and Seattle.

Clay's appreciation of classical music and encouragement of students to attend

Clay Pharaoh

Charting a new path

performances added a further dimension to making the field trips memorable for all those participating. Bruce Danziger (ARCE '88), who enjoys a bi-coastal career with ARUP, credits his career path to Clay. "He said to me, 'Luck is the residue of design,' and that turned out to be a big lesson."

A dual degree holder from Cal Poly with a bachelor's in architectural engineering in 1972 followed by a master's in engineering with a concentration in structural analysis in 1975, Clay's teaching contributions will be missed by colleagues and students alike.



A Trio of Honorees

Celebrating ARCE faculty's decades of service

When three long-standing ARCE faculty members reached major milestones or retired last spring, the department celebrated their decades of service with a reception in the Berg Gallery.

Dennis Schallenger taught Soils for over 20 years in ARCE. He retired to become president of Earth Systems Pacific in San Luis Obispo.

Sat Rihal and Jake Feldman served as full-time faculty for several decades before retiring. Last spring, they completed the five-year Faculty Early Retirement Program (FERP), which allows faculty to retire and continue teaching part time for five more years. Still full of enthusiasm, Sat and Jake will continue in 2009 as members of the part-time faculty pool.



Jake Feldman
(left), Dennis
Schallenger
and Sat Rihal



Building A Master's Program One Brick At A Time

"Pioneers" is how the ARCE master's class of 2008 will always be remembered. The 10 students in the first class were part of the blended program that transitions undergraduates directly into master's classes, awarding both degrees simultaneously upon completion.

For two decades, the idea of a master's program has been discussed and debated as a desirable complement to the undergraduate program. As the requirement of a master's degree for professional licensure becomes more likely, the master's degree becomes increasingly important.

Department Head Al Estes credits Professor Kevin Dong with making the dream happen. "Kevin joined the faculty in 2001 and essentially asked, 'What are we waiting on?'"

Al is pleased to have joined the department at the moment the project was on the edge. "It's not easy getting a graduate program established and approved by the university. A new program in architectural engineering would take several years, but falling under the existing architecture master's degree allowed us to start immediately. Kevin led a faculty team that looked at the options and chose to

create a master's program in architecture with an emphasis in architectural engineering." Al believes that with a few years of documented success, they will meet university requirements more easily and transition to a Master of Architectural Engineering Degree.

After the initial decision in 2006, the program accepted the first students only a few months later. "We didn't want a typical master's program. The idea from the beginning was to build on what Cal Poly is known for: real-world industry focus," says Al. "Even the master's project is not a traditional research thesis. We seek industry partners on thesis committees to make a clear commitment to maintaining our focus."

Students in the program transition from undergraduate to graduate in the spring when they enroll in a Research Methods class. At the same time, they develop a project topic and hopefully connect with an industry partner.

Ideally, students will spend the first post-baccalaureate summer interning with their supporting industry partners to further their understanding of the design profession and start their master's projects. Professor Ansgar Neuenhofer believes this is a strength of the

Master's student Grace Chen (top center) makes adobe bricks with undergrads Anthony Palamas and Nichole Brandt, while Dan Lazzarini (right) works on testing the effectiveness of a post-tensioned retrofit of a masonry wall.



Master's from page 13

program. "High-end technical firms have problems they want researched. We can help them and at the same time give our students a challenge."

Students return to their first full year of graduate study with a project developed, an industry partnership established, and then the coursework starts. "Teaching at the graduate level is rewarding," says Ansgar, citing the advanced problems as well as the level of student motivation and the intimate atmosphere of the smaller class sizes. He

laughs, then adds that he enjoys the opportunity to explore some more theoretical principles with the students "balanced by Kevin's practical focus." Ansgar and Kevin team-teach Advanced Numeric Analysis techniques and enjoy the balance between theoretical and practical, which matches both the needs of the advanced students and the strengths of Cal Poly ARCE.

Once a commitment was made to the program, the faculty spent summer 2007 developing five new courses to include advanced mechanics of materials, finite elements, non-linear analysis and advanced

concrete design. The graduate students also take some architecture courses that they have not seen for several years.

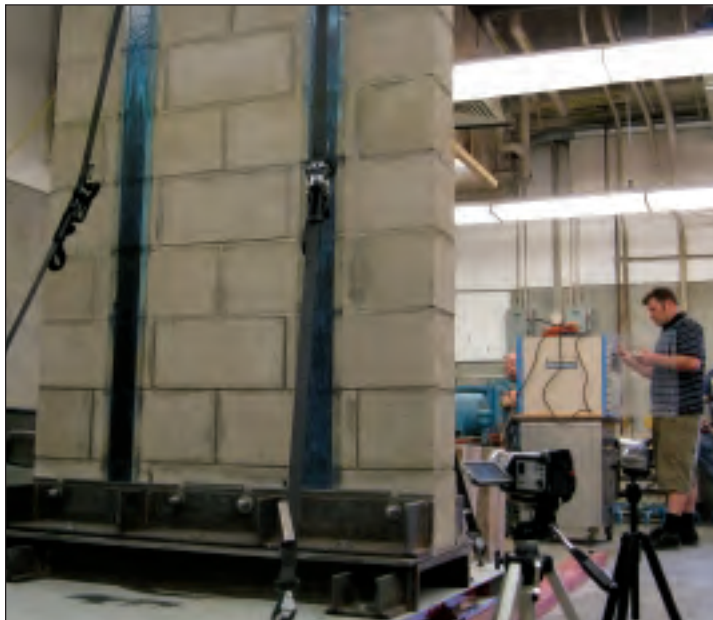
"Given how quickly the program was put together," Al remembers, "I expected at least one catastrophe and urged everyone to maintain a sense of humor. I was amazed that instead everything went smoothly."

One of the hurdles the program anticipated with a rapid start was finding industry partners to meet their needs. "We shouldn't have worried," says Al, listing Degenkolb Engineers, Englekirk and Sabol, Hinman Consulting Engineers, Rutherford & Chekene and Watry Design as just a few of the firms that immediately embraced the program. As it develops, the program will continue to seek partners and perhaps institute some permanent internships.

The second class of master's students are finishing their year of course work, and over 25 applications have been received for the third class.

Pioneering graduate Elizabeth Kenyon, now with Englekirk & Sabol in Santa Ana, looks back on the experience with great appreciation. "I don't know if it was my increased willingness to learn, the smaller class sizes, the already well-established student-professor relationship, or having our own graduate studio that provided this phenomenal learning environment. The grad program was an amazing experience."

Master's student Joseph Williams investigates the effects of fatigue on fiber-reinforced polymers when applied to masonry walls.



Awards & Scholarships

Recognizing Excellence

The annual awards event reflects the successes of our students and the generosity of our supporters.

David A. Lambert

ARCE Academic Excellence - MA

Nathan A. Hicks

ARCE Academic Excellence - BS

Hayley Soderlund

ARCE Service Award

Erica D. Jacobsen

Degenkolb Engineers Scholarship

Kimberly Bowen, Ying Yu (Grace) Chen

Englekirk & Sabol Engineers, Inc. Scholarship

David F. Wollin, Megan M. Stoner

Fluor Foundation Scholarship

Lucas S. Hogan

Forell/Elsesser Scholarship

Lucas S. Hogan

Hans Mager Scholarship

Nathan A. Hicks

Herbert E. Collins Scholarship - BS

Takayuki Yokoyama

Herbert E. Collins Scholarship - MA

Melissa S. Humber

John A. Martin & Associates Scholarship

Alma D. Garcia, Farinaz Jalaie

KNA Senior Project Scholarship

Lisa J. Aukeman

kpff Consulting Engineers Scholarship

Emily A. Carlip

Paul F. Fratessa Memorial Endowment

Melissa S. Humber

Simpson Gumpertz & Heger Inc. Scholarship

Leigh H. Guggemos and Selinda A. Martinez

Simpson Strong-Tie Scholarships

Nathan A. Hicks

SEAONC Scholarship

Hayley Soderlund

SEAOSC Scholarship

Loren K. Galarza

Watry Design, Inc. Scholarship



Senior Projects

Their variety reflects
ARCE's scope and
showcases students'
knowledge and skill

Students collaborate on building a stick structure in Poly Canyon for their senior project (above).

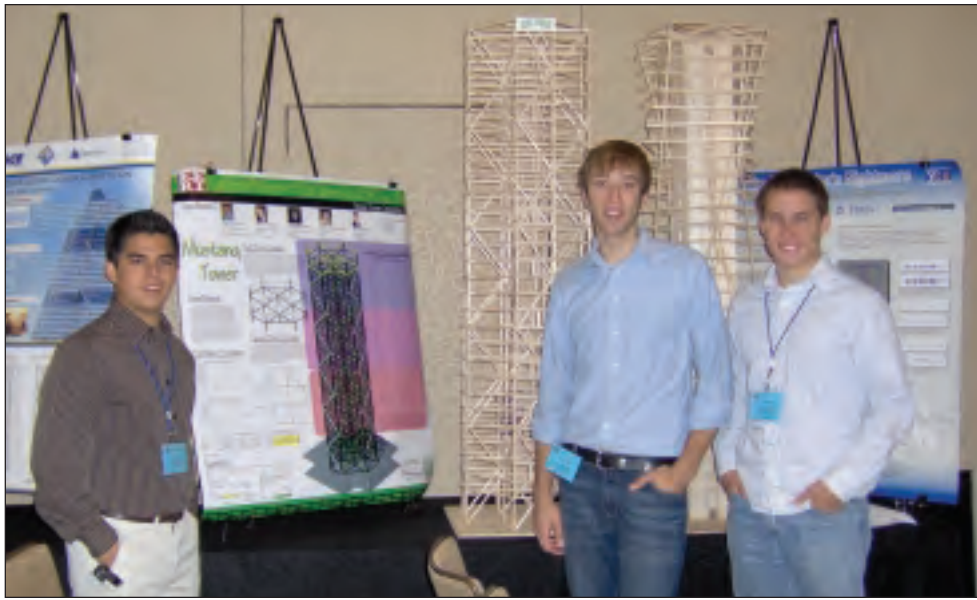
Lucas Hogan found inspiration in bamboo for his project (right).

The name says it all. Senior project is a culminating experience in the collegiate career of an ARCE major. Every project is different, and there is greater freedom, which means there is greater risk. Students are more responsible for their own learning and are required to display greater creativity than in any previous course. Altogether, it is exciting, stressful and, most importantly, a means for students to make their final marks on the program.

Each student works under the supervision of a faculty member, and Professor Craig Baltimore notes it is always an interesting experience. "There's really no right or wrong path," he says. "Just different ones."

Senior projects are a means for undergraduates to contribute to research, but they are a challenge for faculty members who need to balance guiding student efforts towards a





Clockwise from far left:

Jon Rivera (left) and Martin Guzman constructed a bridge for the National Timber Bridge Competition.

Eduardo Lopez (left), Joe Thompson and Alan Tonissen with their winning seismic design entry in the EERI competition

Margaux Burkholder and James Nunno's curriculum engages K-12 students in structural engineering.

Projects

from page 15.

successful solution without contributing to the work themselves.

The variety of senior projects at Cal Poly shows the depth of the program. A faculty member will often develop a senior project that supports an ongoing research project such as finding the dynamic characteristics of small buildings, designing emergency structures, or even supporting K-12 outreach. The senior project is a means for students to enter national competitions such as the big beam competition, the timber bridge competition or the EERI seismic design competition. Students may choose to design or build a structure as a community service project, for example, a pedestrian bridge or a covered structure at an elementary school. And there is still the option of building an experimental structure in Poly Canyon or investigating

a technical question of personal interest. Many projects become interdisciplinary as ARCE students collaborate with architecture, construction and civil engineering students.

Senior Katie Blaesser found herself involved in a team project. "There is a process in place," she says. "The faculty talk about the process and their expectations, then they pitch ideas. Finally, we present proposals. That's where I got together with my team."

The nexus of his idea came to Lucas Hogan in his sophomore year. Fascinated by scaffolding built from bamboo, he began investigating the strength properties. "Wowed," is how he describes his findings. Immediately he recognized that the connections were the difficulty. He spent about a year with Professor Graham Archer "kicking ideas around" and at the same time was invited by a group in Tanzania to look at the feasibility of using bamboo as a building material in that region. For Lucas, this meant his senior project now

had a focus: to develop a safe connection constructed with unskilled labor with a minimal amount of processed materials such as steel or concrete.

Asked how the project has proceeded, Hogan is delighted. "The project afforded me all the opportunities I hoped it would. I had to call upon my knowledge of structural mechanics, steel, concrete and timber. It was a hands-on project and pushed me to think outside the box." Hogan is currently working on a conference paper to be submitted for the CSSAR Sustainability in Architecture held in Tripoli, Libya in November 2009.

To showcase the projects, the department cancels afternoon classes and hosts a multi-session Projects Day Conference, allowing all faculty members, students and visitors to attend the presentations. This year, 19 senior projects led by 12 faculty advisors will be presented at the Projects Day Conference on June 4, and visitors are welcome!

Welcome Advice

Advisory Board helps to keep ARCE on track

The ARCE Advisory Board has made notable contributions to the ARCE program in its 2-1/2 years of service. During five on-campus meetings, it has provided insight and advice on the master's program, the curriculum, facilities improvement and collaboration with other disciplines. The board's suggestions were a major element of the department's self-study that was a key to the successful ABET accreditation in fall 2008.

Advisory Board meetings are hands-on and include interaction with students, faculty and leadership. As the ARCE program takes on a major assessment of the curriculum, the Advisory Board has provided initial guidance and established parameters. Board co-chair Ken O'Dell (ARCE '89) notes that "as graduates of the ARCE program, many of the members appreciate the opportunity to return to campus to participate in a process that helps ensure the vitality of the program as it continues to provide the industry with talented engineering graduates." Department Head Al Estes acknowledges all that the board has done for ARCE.

"After the typical Board meeting, I feel like I have been run over by a truck. After I get back up and dust myself off, I realize that I have been given some wonderfully candid and thought-provoking advice from a col-

"I REALIZE THAT I HAVE BEEN GIVEN SOME WONDERFULLY CANDID AND THOUGHT-PROVOKING ADVICE FROM A COLLABORATIVE GROUP THAT GENUINELY CARES ABOUT THIS PROGRAM."

AL ESTES

laborative group that genuinely cares about this program. I am very grateful for the enthusiasm of the board members and the time they are willing to donate to this program."

David Mar, co-chair of the Advisory Board, hopes that it "represents a broad range of professional activity – giving the ARCE program a vital link to industry." He believes that the board's diverse perspective expands the department's view of current practice as well as giving insights into future trends in regional and global structural engineering.

While the board brings knowledge and enthusiasm to campus, Al continues to call on corporate partners throughout the year, always eager to see young grads at their first professional job, learn about industry innovations and trends, and share news of the program.

ARCE Advisory Board Members

Kurt Clandening

John A. Martin & Associates – Los Angeles

Bob Desautels

ATI Architects & Engineers

Jake Feldman

Cal Poly ARCE emeritus faculty

Mary Goodson

CH2M-Hill

Jorn Halle

Degenkolb – Oakland

Tracy Harris

Harris & Sloan Consulting Group, Inc.

Grace Kang

Forell & Ellsesser

Chris Manning

Overaa Construction

David Mar

Tipping - Mar + Associates

Jonathon McMurtry

Lionakis

Joshua Moody

John A. Martin & Associates – SLO

Ken O'Dell

Myers - Houghton & Partners

Dani Paxson

KPFF – Los Angeles

Art Ross

CYS Structural Engineers, Inc.

Al Estes with the ARCE Advisory Board and CM Department Head Al Hauck (second from left)





An entire generation has benefited from the Structural Engineering Association of California (SEAOC) Structural Forum. The 19th annual “Bridge Design: Spanning from Aesthetics to Engineering,” held in February, continued the tradition of bringing structural engineering professionals to the students.

Presentations were related to the forum theme and exposed students to topics not necessarily covered in ARCE coursework. This year featured James Duxbury’s “The San Francisco Bay Bridge as a Self Anchored Suspension Bridge,” Paul Giroux’s “Building the Brooklyn Bridge” and Gary Rayor’s “Arch and Cable-Supported Pedestrian Bridges.” The career symposium that followed gave students, faculty and professionals the opportunity to interact in a relaxed atmosphere.

The entire event is planned and executed by the students, with funding from attending

Christina Ward and Brian Montgomery with alum and Fluor representative Julia Ramirez (top)
ARCE alums Enoc Lira and Tom Parrish of DES Architects and Engineers (right)

SEAOC/AEI

Association keeps students busy with industry forums, field trips and social events





Clockwise from top:
SEAOC members recently visited Boston's Public Library and Old South Church.

On the job site with Rutherford & Chekene in San Francisco

SEAOC members Selinda Martinez (left) and Melissa Humber enjoy the year-round social activities.



industry partners. Forum Chair Katie Blaesser says that while she was focused on making sure all went well for the speakers, dinner and keynote address, she knows that the alumni and industry representatives who come to talk about their firms are the highlight for many students. "It's a fun day, but from a practical standpoint the students come to get jobs, or to at least learn what people do when they want to get a job."

Bob Desautels, president of ATi Architects-Engineers and an ARCE Advisory Board member, was the banquet guest speaker.

Structural Forum is only one of many SEAOC activities during the year. The Cal Poly chapter is the largest in the state with over 150 members and has recently expanded

to join the Architectural Engineering Institute to become a SEAOC/AEI student chapter. SEAOC chapter goals are development of the students socially, academically and professionally, and as an AEI partner, they will have greater access to student competitions and professional society opportunities.

Already, weekly chapter meetings include industry guest speakers presenting on a wide range of topics from eccentrically braced frame design to what to expect as a young engineer. Other popular activities are social events such as Seventh Week BBQ, Pumpkin Carving, Thanksgiving Dinner, Annual Golf Tournament, and End of the Quarter Parties.

Chapter members also participate in quarterly field trips. In fall 2008, they visited



two San Francisco firms: Rutherford & Chekene, and Nabih Youssef and Associates. They also visited a buckling restrained brace building at UC San Francisco. Spring break 2009 took members to Boston, a trip supported by a sponsorship from Miyamoto, Hope Engineering, Degenkolb, Simpson Strong-Tie and kpff Consulting Engineers.



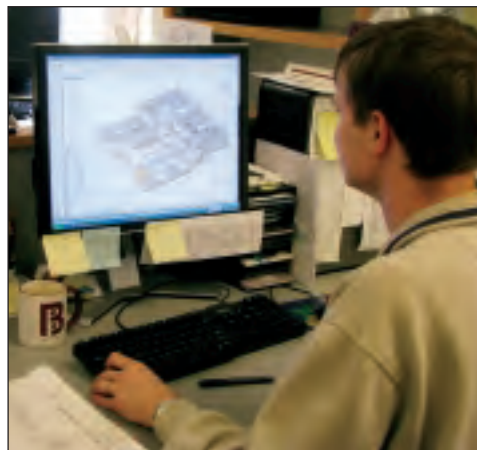
Barrish Pelham & Associates, Inc.



West Placer MS (Creekview Ranch MS) in Roseville (top).

The Lincoln School Historic Restoration (above) won the 2007 SEAOC Best Retrofit Alteration Project.

Matt Mlakar is one of many ARCE alumni working at Barrish Pelham & Associates.



Firm boasts deep family roots and lots of ARCE alums

Barrish Pelham & Associates (BPA) is proud of its history. A third-generation firm, it might be fair to say it is also on a third generation of Cal Poly ARCE grads with firm President Stephen Pelham ('76) and Principal Ian Williams ('87), followed by Associates Gyorgy Guevarra ('01) and Matt Mlakar ('01). The latest generation has joined in the past three years: Tim Lindsey ('06), Josh Pilorin ('06), Eric Slominski ('08).

Steve Pelham (ARCE '76) is president-elect of the Structural Engineering Association of California and will soon join the Cal Poly ARCE Advisory Board. He acknowledges the strong connection and doesn't hesitate to credit Cal Poly as a great start to his engineering career both personally and professionally.

"The practice-based education combined with a fantastic alumni network opened many doors. At BPA we are proud to continue that tradition through donations, internships and recruiting from the program. Approximately

50 percent of our engineering staff graduated from Cal Poly.”

If, to an outsider, this creates a family-like atmosphere, BPA would agree. The principals are committed to a policy of “hands on and doors open,” purposefully limiting growth to no more than 25 employees in order to provide personal service to their clients. In style and practice they like the idea of a family environment, particularly when that environment results in *Structural Engineer* magazine naming BPA as one of the Top Ten Best SE Firms to Work For in the nation in 2007 and 2008, along with the Best Employee Recognition Program in 2008. The honors don’t stop there as *Sacramento Business Journal* honored BPA in 2008 with an A+ Employer Award.

With over 60 years of experience, the firm is proud of its motto, “Expertise, Integrity, and Service.” These principles are evident in a list of BPA awards that includes the 2009 CASH Award of Excellence: Vista del Lago High School, Rainforth Grau Architects; 2009 Sacramento Best New Public Project: West Placer Middle School, Perkins + Will Architects; 2007 SEAOC Best Retrofit Alteration Project: Lincoln School Historic Restoration, Stafford King Wiese Architects; and numerous AIA award projects.

Teri Jamison (ARCH ’92), the Vista del Lago High School client and architect with Rainforth Grau Architects, says: “BPA delivers customized engineering solutions that successfully interface structural systems to a diversity of architectural designs.”

BPA is poised for a strong future with a wide variety of projects, including seismic retrofit of historic structures to new multi-story buildings.

Always looking forward, it is deeply involved with interdisciplinary collaboration through Building Information Modeling (BIM). Combining this technology with Lean Construction practices has allowed BPA’s staff to deliver publically financed projects in less time and at a lower cost.

Given the current challenges to local and state government, advancing construction technology and efficiency is of critical importance to BPA, as is providing facilities for the future education, health and civic activities of society.



For more information about Barrish Pelham & Associates, visit www.barrish.com. See our previously profiled industry partners at www.arce.calpoly.edu.



Tracy High School (left)

The library at Vista del Lago High School (below) won the 2009 CASH Award of Excellence.





ARCE Upgrade

Department welcomes expansion of facilities for faculty, staff and students

ARCE received a much-appreciated facelift over the past year as part of a larger package of state funding provided under the Joint Cooperative Agreement (JCAIIB). The department benefited from renovated administrative space and faculty offices as well as some new furniture. In addition, the completion of the Construction Innovations Center freed up space in other college buildings and allowed for an expansion of ARCE facilities to include two new laboratory spaces, a classroom and a computer lab.

Brent Nuttall (top) and other ARCE faculty now enjoy individual office spaces.

New classroom furniture is a welcome addition to ARCE students Joe Nunneley (above, left) and Emmett Seymour (far right), who help tutor ARCE 211 and ARCE 212 students.

“Prior to the renovation some professors shared offices, a situation not conducive to research or private meeting with students,” notes faculty member Brent Nuttall. The renovation provided individual offices to full-time faculty. A larger common space was created for the use of part-time faculty.

Visitors will notice an expanded reception area and staff work areas. “We have space for student workers, waiting space, additional storage for files,” says Administrative Support Coordinator Christine Cobb. “It has made a tremendous difference in how we work and the way we accommodate visitors.”

Graduate program coordinator Kevin Dong is pleased to have a combined lab, classroom and office area for master’s students. “Communication is essential for a master’s program. We want students to learn from each other as well as from the instructors. Now, in the new lab, they set up shop and establish a camaraderie from the beginning.”

There’s new furniture in A-lab, thanks to state-allocated funds, and private funds bought carpet and allowed for the building of an elevated stage. The ultimate goal is a state-of-the-art classroom and conference facility.

SEAO President Lucas Hogan is pleased with the upgrades. “We bring a speaker in every week, and it’s nice to have a professional room that can accommodate the large attendance. Also, the adjustable layout is great for students working on group projects or conferencing.” Window treatments are next and eventually an industry sponsor.

As pleased as he is with the renovation, Department Head Al Estes is always looking to the future. “The Advisory Board helped us target the Scarab computer lab as the next challenge,” he says. Formerly shared with Construction Management, it is now entirely ARCE’s “and needs some pride of ownership.” Until external funds are secured, “newer” furniture has been added and a central station was created to plug in personal computers and assemble plots.

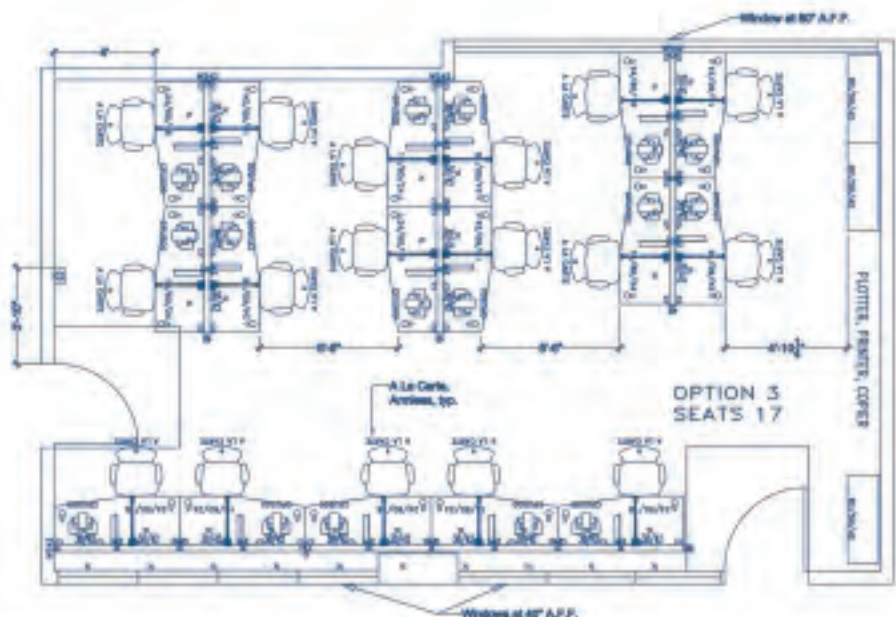
“Facilities are only one part of the educational package, but they shouldn’t be underestimated,” says Al. “We need to bring the quality of our facilities to a level that matches the quality of our students and faculty.”

He indicates a willingness to do whatever it takes to make improvements. “We will con-

tinue to use student fees, spend discretionary money, use in-house labor, leverage research dollars and seek donor funding to upgrade classrooms, lab, and equipment. I will continue to package our needs in a manner that will be attractive to those who wish to step in, be a part of this outstanding program and give us that next boost.”

Carrie South greets students, colleagues and faculty in an expansive new front office (below).

A plan to upgrade the Scarab lab will become a reality when additional external funding is secured (bottom).





'THE BLADE' REACHES ON

Hilti Inc. and Wallock & Maggio, Inc. combined forces to perform a critical repair on the new prestressed concrete blade structure in Poly Canyon. The 20-foot "flower" replaced the deteriorating original, "A Sculptural Study in Prestressed Concrete," built in 1963 by CAED students Steve Gilmore, Mark Haselton, Ken Minor and the late Dan McMann as one of the first experimental structures at Cal Poly.

Students Susan Smilanich, Jon Voorhies, Ben Green, Mike McDonnell and Robert Pacheco won an Award of Excellence at the 2006 Post Tensioning Institute Awards for their design of a replacement concrete blade structure.

Peter Zahm, Josh Johnson and Lucas Floriani of Hilti coordinated with Chris Wallock of Wallock and Maggio to investigate and conduct the repair, which involved the injection of adhesive into the concrete cracks. The work turned into a lesson for 48 students enrolled in the ARCE 452 Concrete Design and Constructability Lab who visited the site during their scheduled class period. Accompanied by faculty members Brent Nuttall, Kevin Dong and Peter Laursen, students observed the repair and learned on-site about available repair methods.

ARCE extends its appreciation to both Hilti and Wallock and Maggio for their generous donations of time and talent to restore this important structure.



The concrete blade design teams from yesterday and today (top)

The original concrete blade, designed in 1963 (left)

Hilti representative Peter Zahm investigates the replacement structure (above).